

## **What is claimed is:**

**[Claim 1]** 1. A thread spacer for a tapered threaded connection between drill pipes, the thread spacer comprising a thin, hollow, truncated conical member; the conical member comprising an exterior portion and an interior portion, and undulating threads formed on the exterior and interior portions;

wherein the conical member of the thread spacer is fixed upon one of a set of threads of the tapered threaded connection.

**[Claim 2]** 2. The thread spacer of claim 1 further comprising a flange.

**[Claim 3]** 3. The thread spacer of claim 2 further comprising a plurality of flanges.

**[Claim 4]** 4. The thread spacer of claim 2 further comprising a plurality of precut tabs formed on the conical member.

**[Claim 5]** 5. The thread spacer of claim 4 wherein the flange is attached to the precut tabs of the thread spacer.

**[Claim 6]** 6. The thread spacer of claim 3 further comprising a plurality of precut tabs formed on the conical member wherein each flange is attached to the precut tabs of the thread spacer.

**[Claim 7]** 7. The thread spacer of claim 4 further comprising a plurality of flanges wherein each flange is attached to precut tabs of the thread spacer.

**[Claim 8]** 8. The thread spacer of claim 1 wherein the conical member is fixed upon one of the sets of threads of the tapered threaded connection with a fixative selected from the group consisting of adhesives, precut tabs, sandblasting the set of threads, cold working the set of threads, shot blasting the set of threads, and grit blasting the set of threads.

**[Claim 9]** 9. The thread spacer of claim 1 wherein the conical member is fixed upon one of the set of threads of the tapered threaded connection with a fastener selected from the group consisting of screws, latches, pins, and dimples.

**[Claim 10]** 10. The thread spacer of claim 2 wherein the tapered threaded connection comprises a shoulder, and the flange is fixed upon the shoulder.

**[Claim 11]** 11. The thread spacer of claim 2 wherein the tapered threaded connection comprises a male set of threads mated with a female set of threads, and an opposing pair of shoulders; wherein the thread spacer is intermediate the sets of threads, and the flange is compressed between the shoulders.

**[Claim 12]** 12. The thread spacer of claim 11 wherein the flange is fixed upon one of the shoulders.

**[Claim 13]** 13. The thread spacer of claim 12 wherein the conical member is fixed upon one of the sets of threads of the tapered threaded connection with a fixative selected from the group consisting of adhesives, precut tabs, sandblasting the set of threads, cold working the set of threads, shot blasting the set of threads, and grit blasting the set of threads.

**[Claim 14]** 14. The thread spacer of claim 12 wherein the conical member is fixed upon one of the set of threads of the tapered threaded connection with a fastener selected from the group consisting of screws, latches, pins, and dimples.

**[Claim 15]** 15. The thread spacer of claim 12 wherein the flange is fixed within a groove in one of the shoulders.

**[Claim 16]** 16. The thread spacer of claim 15 wherein the flange is fixed in the groove of the shoulder associated with the male set of threads and the conical member is fixed upon the female set of threads.

**[Claim 17]** 17. The thread spacer of claim 15 wherein the flange is fixed in the groove of the shoulder associated with the female set of threads and the conical member is fixed upon the male set of threads.

**[Claim 18]** 18. The thread spacer of claim 15 wherein the flange is fixed in the groove of the shoulder associated with the male set of threads and the conical member is fixed upon the male set of threads.

**[Claim 19]** 19. The thread spacer of claim 15 wherein the flange is fixed in the groove of the shoulder associated with the female set of threads and the conical member is fixed upon the female set of threads.

**[Claim 20]** 20. The thread spacer of claim 15 wherein the groove of the shoulder where the flange is fixed has a configuration, the configuration of the groove is selected from the group consisting of overhanging grooves, under hanging grooves, straight ended grooves, curved sided grooves, protruding dimpled grooves, recessed dimple grooves, "T" shaped grooves with protruding dimples, "T" shaped grooves with undercuts, "T" shaped grooves

with secondary grooves, “T” shaped grooves with overhanging grooves, “T” shaped grooves with under hanging grooves and combinations thereof .

[Claim 21] 21. A tapered threaded connection for drill pipes comprising set of male threads, a set of female threads, and a pair of shoulders, a thread spacer intermediate the set of male threads and the set of female threads;

the thread spacer comprising a thin, hollow, truncated conical member;  
the conical member comprising an exterior portion and an interior portion, and undulating threads formed on the exterior and interior portions;  
wherein the thread spacer is fixed upon one of the sets of threads.

[Claim 22] 22. The tapered threaded connection of claim 21 further comprising a flange.

[Claim 23] 23. The tapered threaded connection of claim 22 further comprising a plurality of flanges.

[Claim 24] 24. The tapered threaded connection of claim 22 further comprising a plurality of precut tabs formed on the conical member.

[Claim 25] 25. The tapered threaded connection of claim 24 wherein the flange is attached to the precut tabs of the thread spacer.

[Claim 26] 26. The tapered threaded connection of claim 23 further comprising a plurality of precut tabs formed on the conical member wherein each flange is attached to the precut tabs of the thread spacer.

**[Claim 27]** 27. The tapered threaded connection of claim 24 further comprising a plurality of flanges wherein each flange is attached to precut tabs of the thread spacer.

**[Claim 28]** 28. The tapered threaded connection of claim 21 wherein the conical member is fixed upon one of the sets of threads of the tapered threaded connection with a fixative selected from the group consisting of adhesives, precut tabs, sandblasting the set of threads, cold working the set of threads, shot blasting the set of threads, and grit blasting the set of threads.

**[Claim 29]** 29. The tapered threaded connection of claim 21 wherein the conical member is fixed upon one of the set of threads of the tapered threaded connection with a fastener selected from the group consisting of screws, latches, pins, and dimples.

**[Claim 30]** 30. The tapered threaded connection of claim 22 wherein the flange is fixed upon one of the shoulders.

**[Claim 31]** 31. The tapered threaded connection of claim 22 wherein the thread spacer is intermediate the sets of threads, and the flange is compressed between the shoulders.

**[Claim 32]** 32. The tapered threaded connection of claim 31 wherein the flange is fixed upon one of the shoulders.

**[Claim 33]** 33. The tapered threaded connection of claim 22 wherein the conical member is fixed upon one of the sets of threads of the tapered threaded connection with a fixative selected from the group consisting of adhesives, precut tabs, sandblasting the set of threads, cold working the set of threads, shot blasting the set of threads, and grit blasting the set of threads.

**[Claim 34]** 34. The tapered threaded connection of claim 22 wherein the conical member is fixed upon one of the set of threads of the tapered threaded connection with a fastener selected from the group consisting of screws, latches, pins, and dimples.

**[Claim 35]** 35. The tapered threaded connection of claim 22 wherein the flange is fixed within a groove in one of the shoulders.

**[Claim 36]** 36. The tapered threaded connection of claim 25 wherein the flange is fixed in the groove of the shoulder associated with the male set of threads and the conical member is fixed upon the female set of threads.

**[Claim 37]** 37. The tapered threaded connection of claim 25 wherein the flange is fixed in the groove of the shoulder associated with the female set of threads and the conical member is fixed upon the male set of threads.

**[Claim 38]** 38. The tapered threaded connection of claim 25 wherein the flange is fixed in the groove of the shoulder associated with the male set of threads and the conical member is fixed upon the male set of threads.

**[Claim 39]** 39. The tapered threaded connection of claim 25 wherein the flange is fixed in the groove of the shoulder associated with the female set of threads and the conical member is fixed upon the female set of threads.

**[Claim 40]** 40. The tapered threaded connection of claim 25 wherein the groove of the shoulder where the flange is fixed has a configuration, and wherein the configuration of the groove is selected from the group consisting of overhanging grooves, under hanging grooves, straight ended grooves,

curved sided grooves, protruding dimpled grooves, recessed dimple grooves, “T” shaped grooves with protruding dimples, “T” shaped grooves with undercuts, “T” shaped grooves with secondary grooves, “T” shaped grooves with overhanging grooves, “T” shaped grooves with under hanging grooves and combinations thereof.

**[Claim 41]** 41. A drill pipe comprising a longitudinal axis, two tapered ends, a set of threads on each tapered end, and a thread spacer;

the thread spacer comprising a thin, hollow, truncated conical member;  
the conical member comprising an exterior portion and an interior portion, and undulating threads formed on the exterior and interior portions;  
wherein the conical member of the thread spacer is fixed upon one of the sets of threads of the drill pipe.

**[Claim 42]** 42. The drill pipe of claim 41 further comprising a flange.

**[Claim 43]** 43. The drill pipe of claim 42 further comprising a plurality of flanges.

**[Claim 44]** 44. The drill pipe of claim 42 further comprising a plurality of precut tabs formed on the conical member.

**[Claim 45]** 45. The drill pipe of claim 44 wherein the flange is attached to the precut tabs of the thread spacer.

**[Claim 46]** 46. The drill pipe of claim 43 further comprising a plurality of precut tabs formed on the conical member wherein each flange is attached to the precut tabs of the thread spacer.

**[Claim 47]** 47. The drill pipe of claim 44 further comprising a plurality of flanges wherein each flange is attached to precut tabs of the thread spacer.

**[Claim 48]** 48. The drill pipe of claim 41 wherein the conical member is fixed upon one of the sets of threads with a fixative selected from the group consisting of adhesives, precut tabs, sandblasting the set of threads, cold working the set of threads, shot blasting the set of threads, and grit blasting the set of threads.

**[Claim 49]** 49. The drill pipe of claim 41 wherein the conical member is fixed upon one of the set of threads of the drill pipe with a fastener selected from the group consisting of screws, latches, pins, and dimples.

**[Claim 50]** 50. The drill pipe of claim 42 comprising a shoulder on at least one of the tapered ends wherein the flange is fixed upon the shoulder.

**[Claim 51]** 51. The drill pipe of claim 42 wherein one of the tapered ends comprises a set of threads mated with a corresponding set of threads on a second drill pipe, and opposing shoulders adjacent the sets of threads; wherein the thread spacer is intermediate the sets of threads, and the flange is compressed between the shoulders.

**[Claim 52]** 52. The drill pipe of claim 51 wherein the flange is fixed upon one of the shoulders.

**[Claim 53]** 53. The drill pipe of claim 52 wherein the conical member is fixed upon one of the sets of threads of the drill pipe with a fixative selected from the group consisting of adhesives, precut tabs, sandblasting the set of



threads, cold working the set of threads, shot blasting the set of threads, and grit blasting the set of threads.

**[Claim 54]** 54. The drill pipe of claim 52 wherein the conical member is fixed upon one of the set of threads of the drill pipe with a fastener selected from the group consisting of screws, latches, pins, and dimples.

**[Claim 55]** 55. The drill pipe of claim 52 wherein the flange is fixed within a groove in one of the shoulders.

**[Claim 56]** 56. The drill pipe of claim 55 wherein the flange is fixed in the groove of the shoulder associated with a male set of threads and the conical member is fixed upon a female set of threads.

**[Claim 57]** 57. The drill pipe of claim 55 wherein the flange is fixed in the groove of the shoulder associated with a female set of threads and the conical member is fixed upon a male set of threads.

**[Claim 58]** 58. The drill pipe of claim 55 wherein the flange is fixed in the groove of the shoulder associated with a male set of threads and the conical member is fixed upon the male set of threads.

**[Claim 59]** 59. The drill pipe of claim 55 wherein the flange is fixed in the groove of the shoulder associated with a female set of threads and the conical member is fixed upon the female set of threads.

**[Claim 60]** 60. The drill pipe of claim 55 wherein the groove of the shoulder where the flange is fixed has a configuration, the configuration of the groove is selected from the group consisting of overhanging grooves, under hanging

grooves, straight ended grooves, curved sided grooves, protruding dimpled grooves, recessed dimple grooves, “T” shaped grooves with protruding dimples, “T” shaped grooves with undercuts, “T” shaped grooves with secondary grooves, “T” shaped grooves with overhanging grooves, “T” shaped grooves with under hanging grooves and combinations thereof .